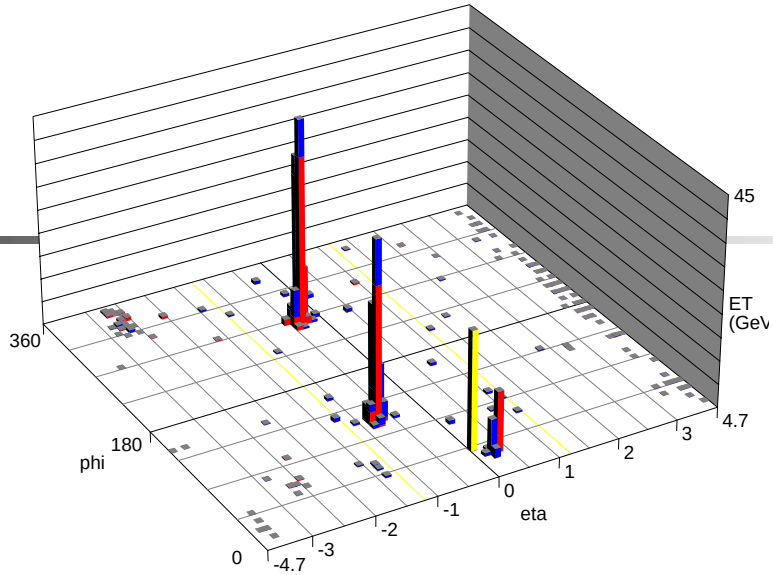


Calorimeter Shifter Tutorial

Norm Buchanan

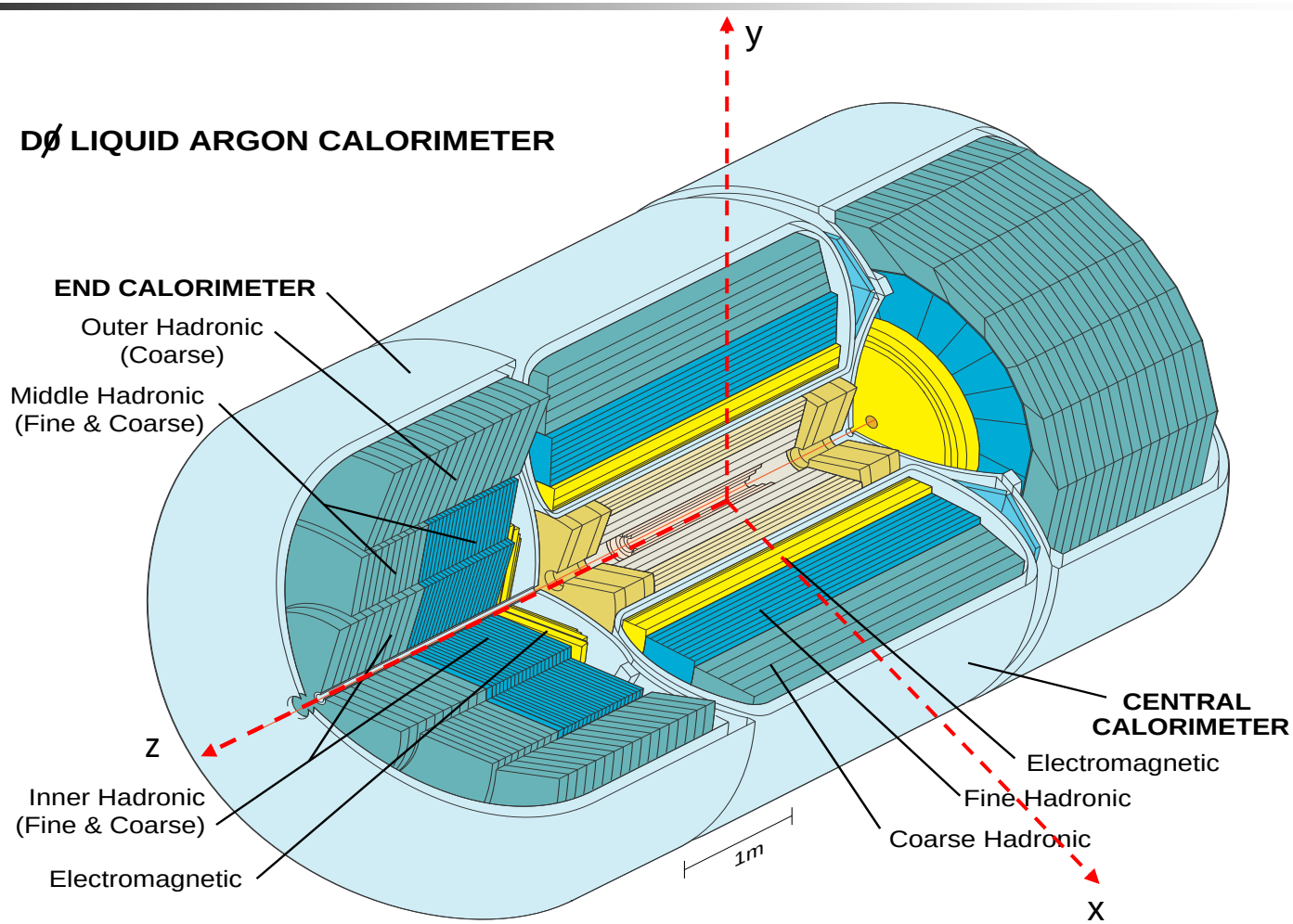
for the Calorimeter Group

March 2, 2005

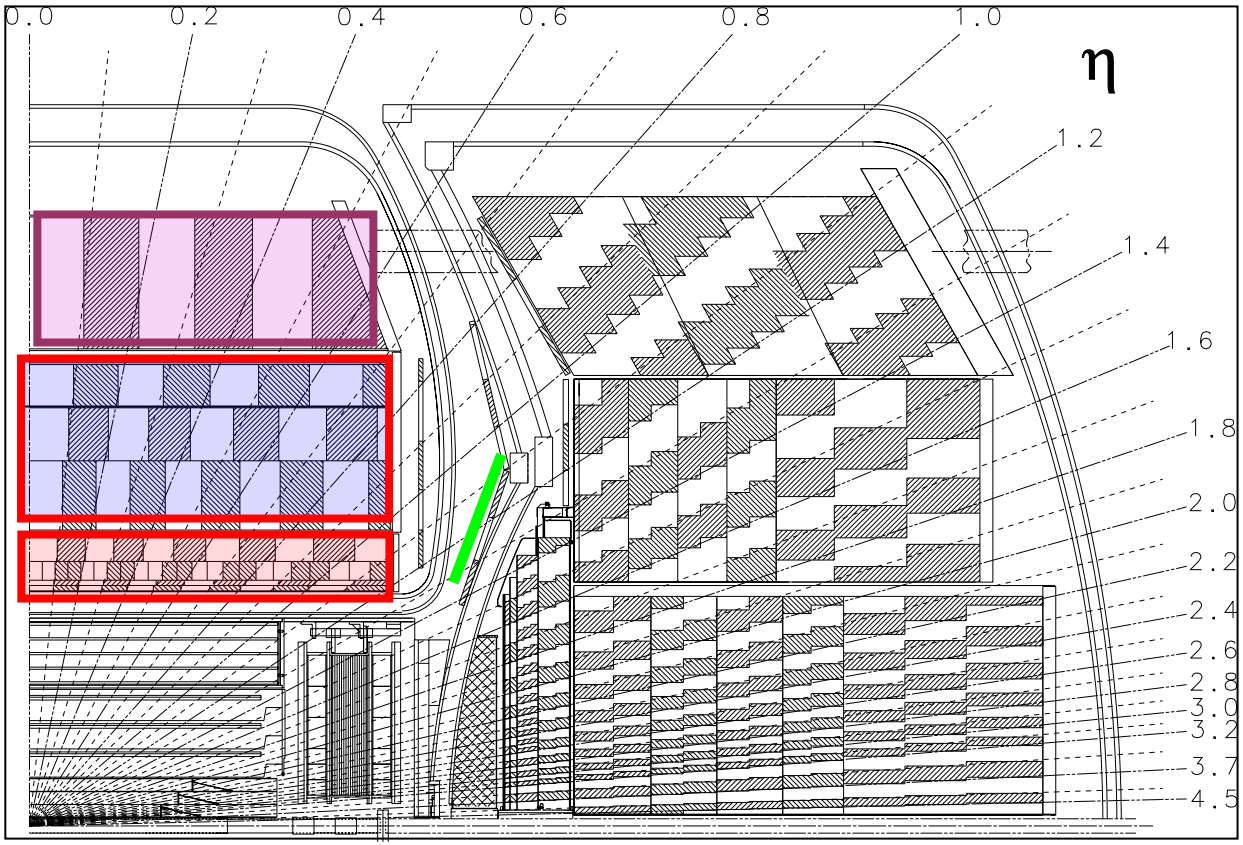
Outline

- Calorimeter Overview
- Shifter Tasks
- GUI Descriptions
- To do during store
- To do between stores

Calorimeter Overview



Overview cont...



Liquid Argon

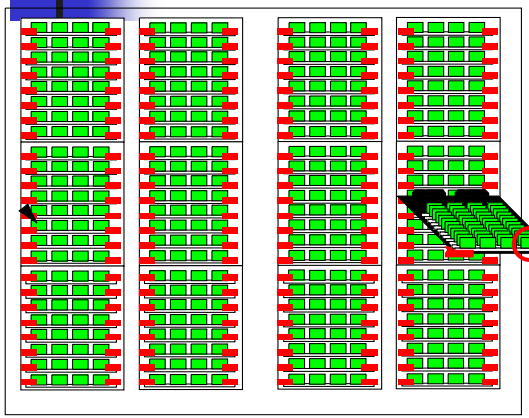
- Electromagnetic
- Fine hadronic
- Coarse hadronic

Scintillating

- Inter-cryostat detector

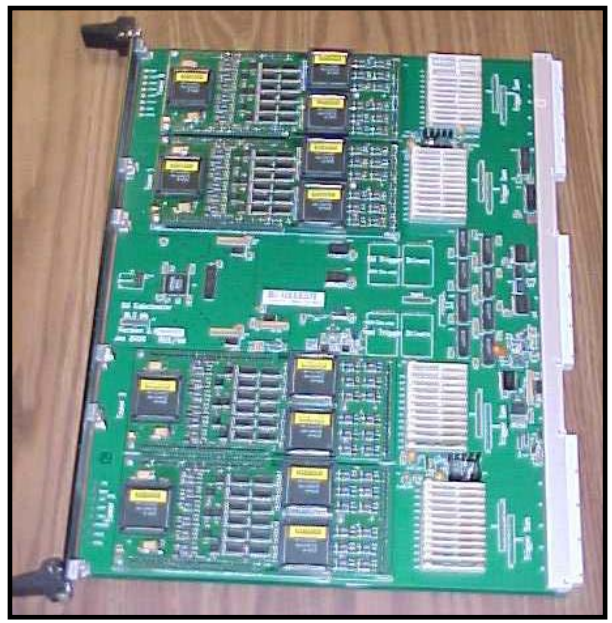
~55,000 readout channels

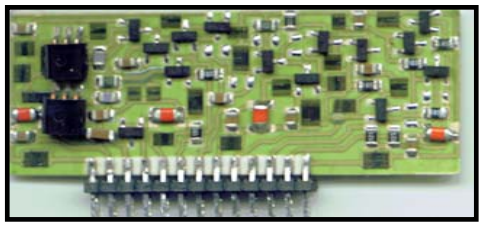
Precision Readout



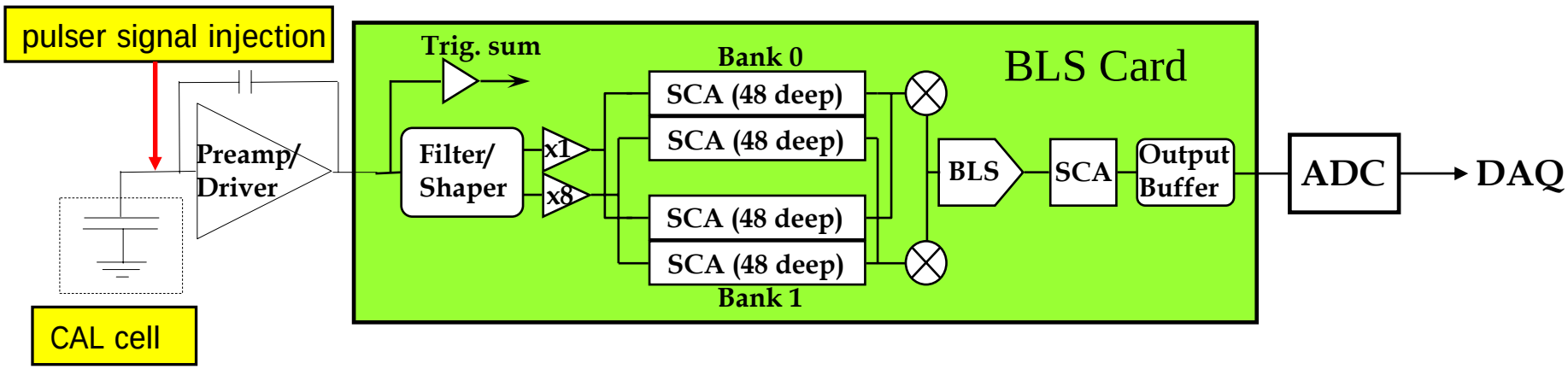
preamp crates

BLS card

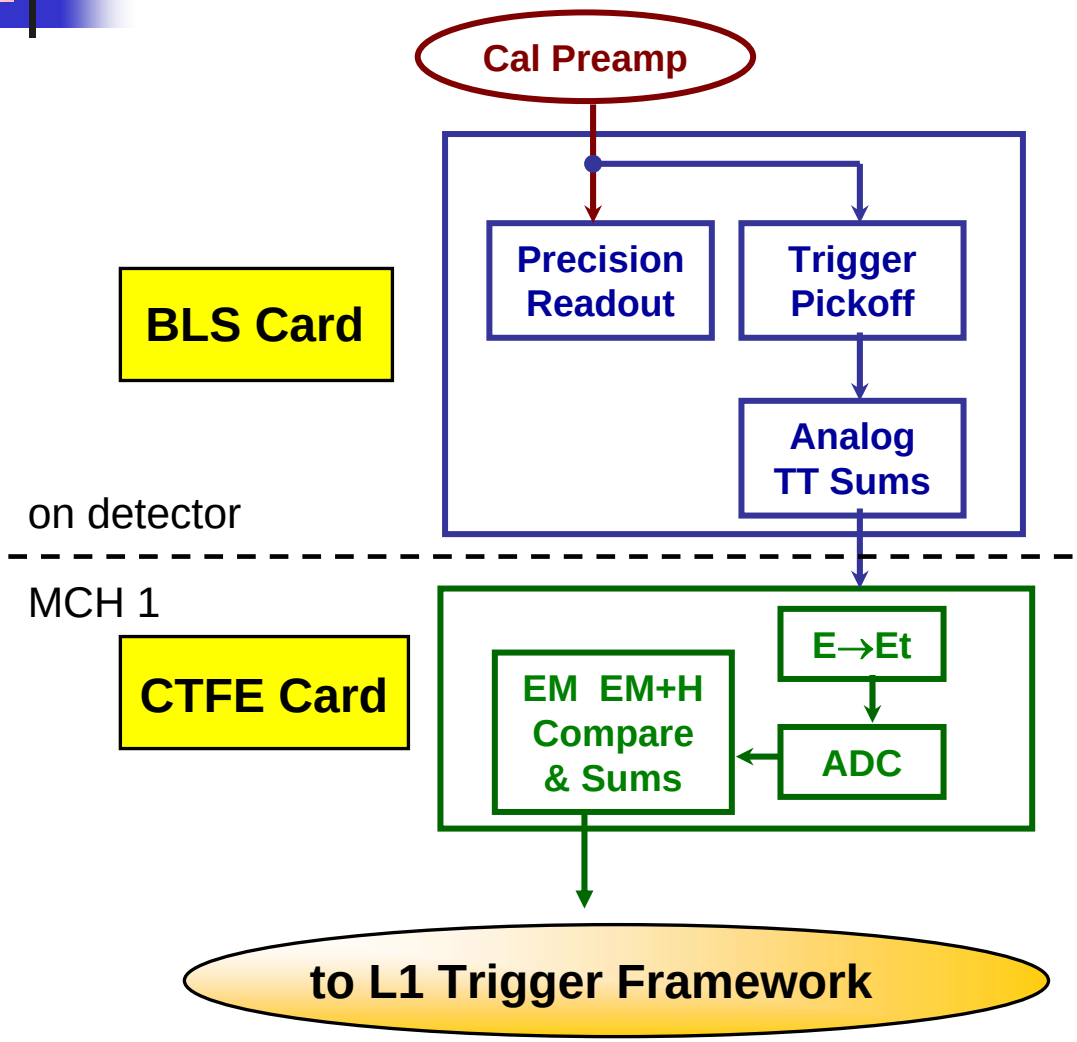




preamp



L1 Calorimeter Trigger

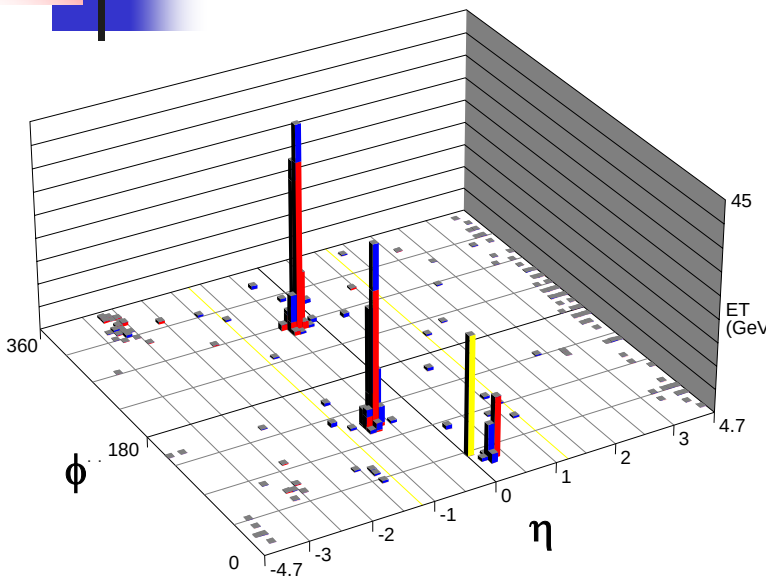


40 x 32 Trigger Towers
0.2 x 0.2 in $\Delta\eta$ x $\Delta\phi$

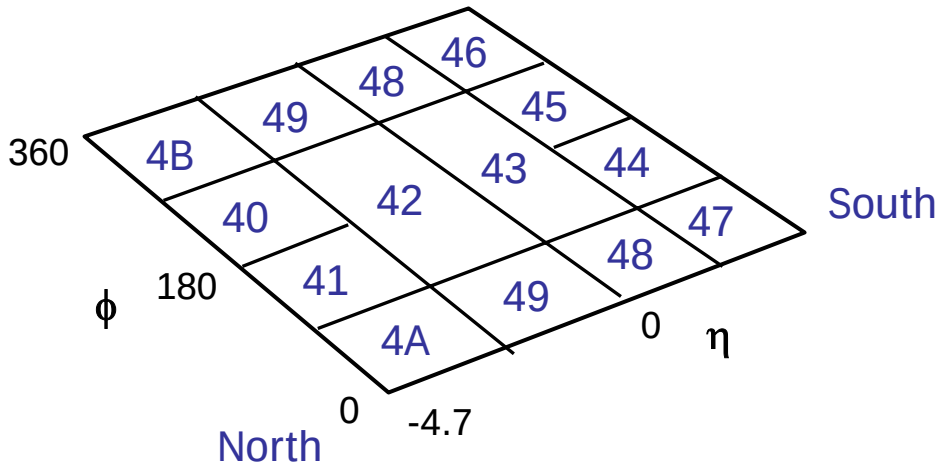
2560 differential analog Trigger pickoff signals

1280 EM samples
1280 HD samples

How is it all related?



Physics display



Level 3 readout crate

Cathedral

Preamps (and PSs)

1 Crate per ADC crate

2 PS per crate (1 + backup)

Platform

BLS cards (and PSs)

6 Crates per ADC crate

1 PS per 2 BLS crates

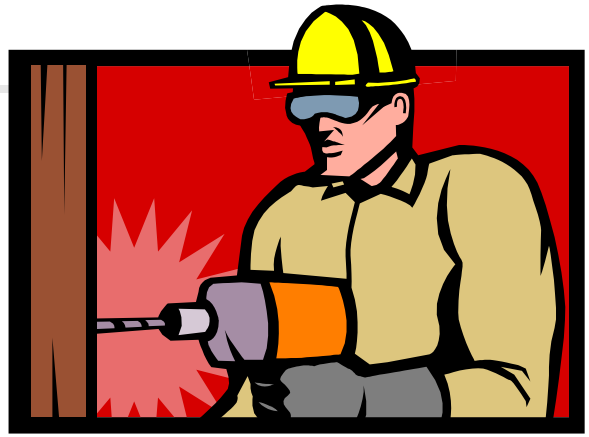
MCH 3

ADC cards (and PSs)

12 Crates

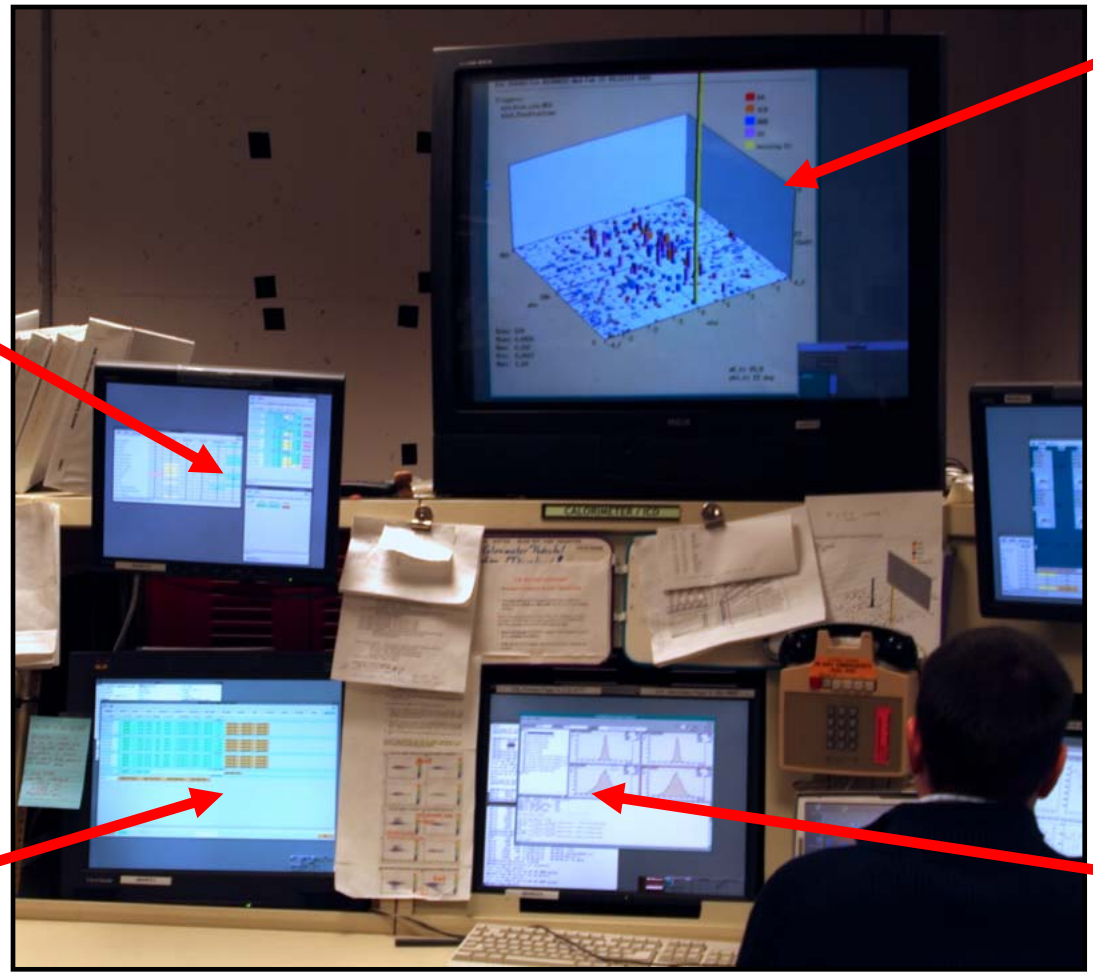
1 PS per 2 ADC crates

Shifter's duties



- Be familiar with the console
- Run and watch the examines
  - Cal data quality
  - L1 CAL examine
- Make sure all GUIs are opened
  - Supply GUI, alarm display, taker, logbook etc…
- Look for alarms or unusual conditions (pink=trouble)
- Use the logbook
  - fill out the end of run summary and paste plots
  - note anything out of the ordinary (such as calling expert)
- Take pedestal calibration runs between stores
- Assist expert with taking NLC calibrations

Calorimeter Console



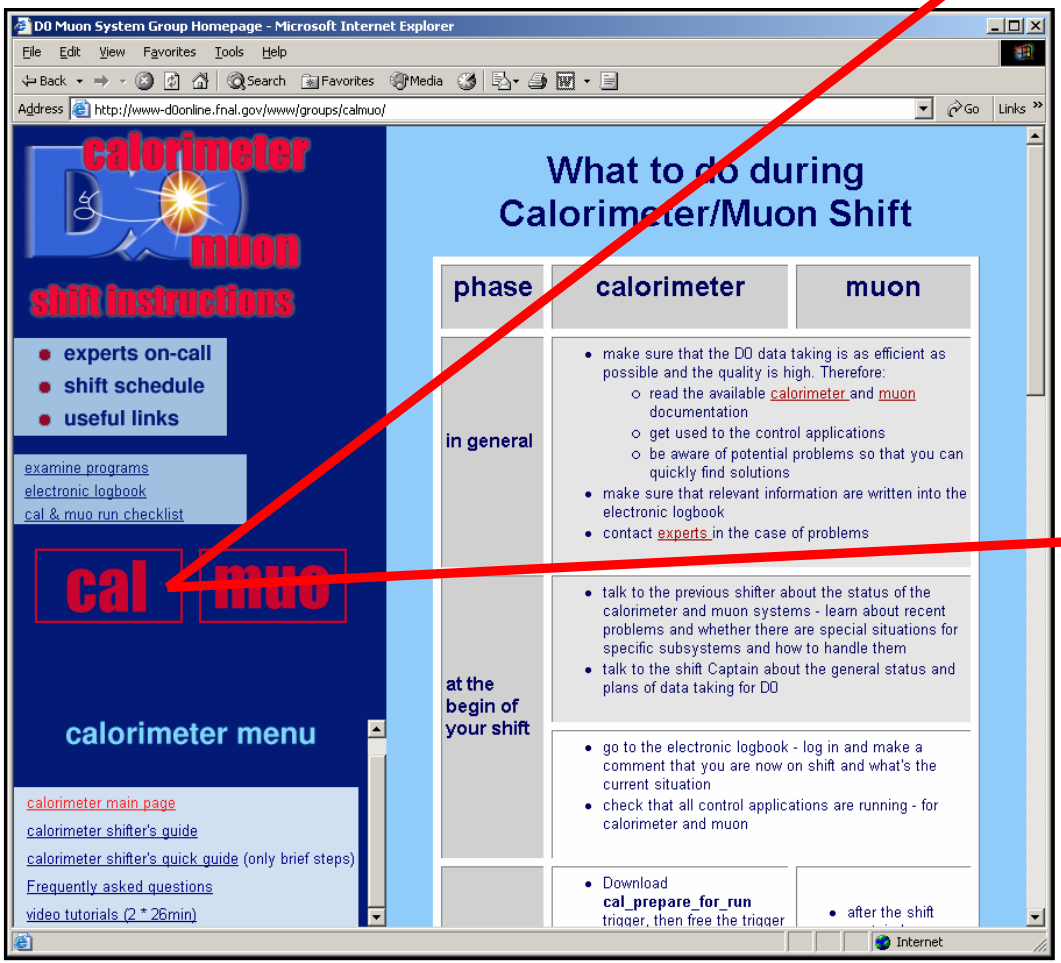
Lego plot
$E_T(\eta,\phi)$

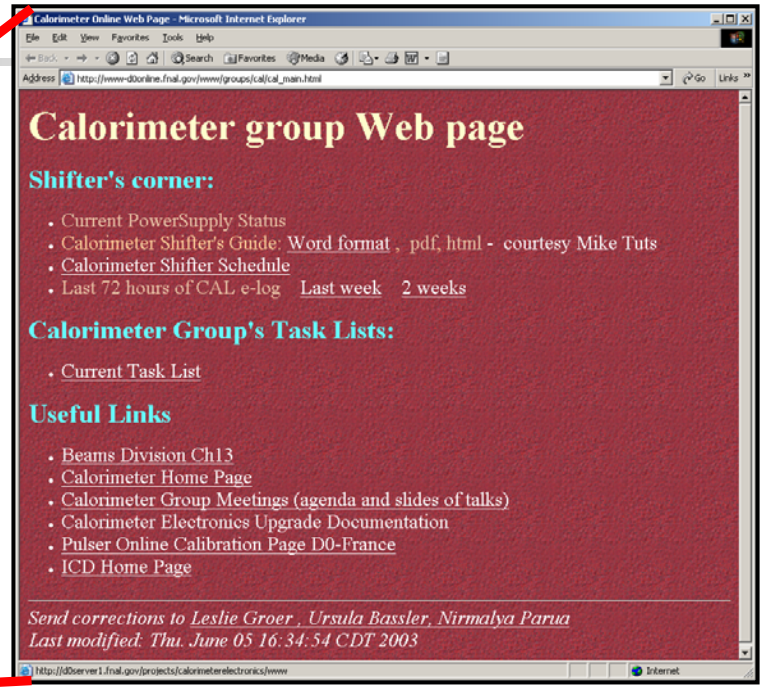
Alarms/Status

Cal utilities

Examines
and taker

CALMUO Web Page





- **Shifter's guide**
- **On-call contacts**
- **Shift schedule**
- **Useful links**

start_cal

A script that properly starts cal utilities

What you need to know

- start_cal all (starts all standard GUIs)
- start_cal (lists all possible arguments, when in doubt use this)

Some useful commands

- start_cal supply (starts Supply GUI)
- start_cal alarm (starts alarm watcher)
- start_cal hv (starts high voltage GUI)
- start_cal D0Run (change to d0run user)
- start_cal rmi (starts rack monitor GUI)
- start_cal ioc (starts IOC monitoring)
- start_cal dq_calo
- start_cal dq_monitor (cal examine)
- start_cal l1examine_d0ol23
- start_cal l1examine (l1cal examine)
- start_cal calib (calibration GUI)

GUIs – Alarms

"start_cal alarm"

File View Settings Help

	MAJOR	MINOR	INVALID	ACKED	DISABLED	GOOD
CAL Preamp	0	4	0	0	0	8
CAL BLS N	0	0	0	0	0	0
CAL BLS C	0	0	0	0	0	0
CAL BLS S	0	0	0	0	0	1
CAL BLS BCK N	0	0	0	0	0	1
CAL BLS BCK C	0	0	0	0	0	0
CAL BLS BCK S	0	1	0	0	0	0
CAL ADC Temp	0	4	0	0	1	0
CAL PA Temp	0	4	0	0	8	1
CAL Fanout	0	0	0	0	0	19
CAL ADC	0	0	0	0	0	0
Pulser	0	1	0	0	1	3
CAL HV	0	2	0	0	50	0
CAL MCH Protection	0	0	0	0	0	0
CAL Platform Protection	0	0	0	0	0	0
CAL Controls	0	9	0	0	0	0

Status: Connection to server opened

CAL HV :Disabled Alarms

CALC_HVC_17C/VOLT
CALC_HVC_45C/VOLT
CALC_HVC_LAR0/STATE
CALC_HVC_LAR0/VOLT
CALC_HVC_LAR1/STATE
CALC_HVC_LAR1/VOLT
CALC_HVC_LAR2/STATE
CALC_HVC_LAR2/VOLT
CALC_HVC_LAR3/STATE
CALC_HVC_LAR3/VOLT
CALC_HVC_LAR4/STATE
CALC_HVC_LAR4/VOLT
CALC_HVC_LAR5/STATE
CALC_HVC_LAR5/VOLT
CALC_HVC_LAR6/STATE
CALC_HVC_LAR6/VOLT
CALC_HVC_LAR7/STATE
CALC_HVC_LAR7/VOLT
CALN_HVC_LAR0/STATE
CALN_HVC_LAR0/VOLT
CALN_HVC_LAR1/STATE
CALN_HVC_LAR1/VOLT
CALN_HVC_LAR2/STATE
CALN_HVC_LAR2/VOLT

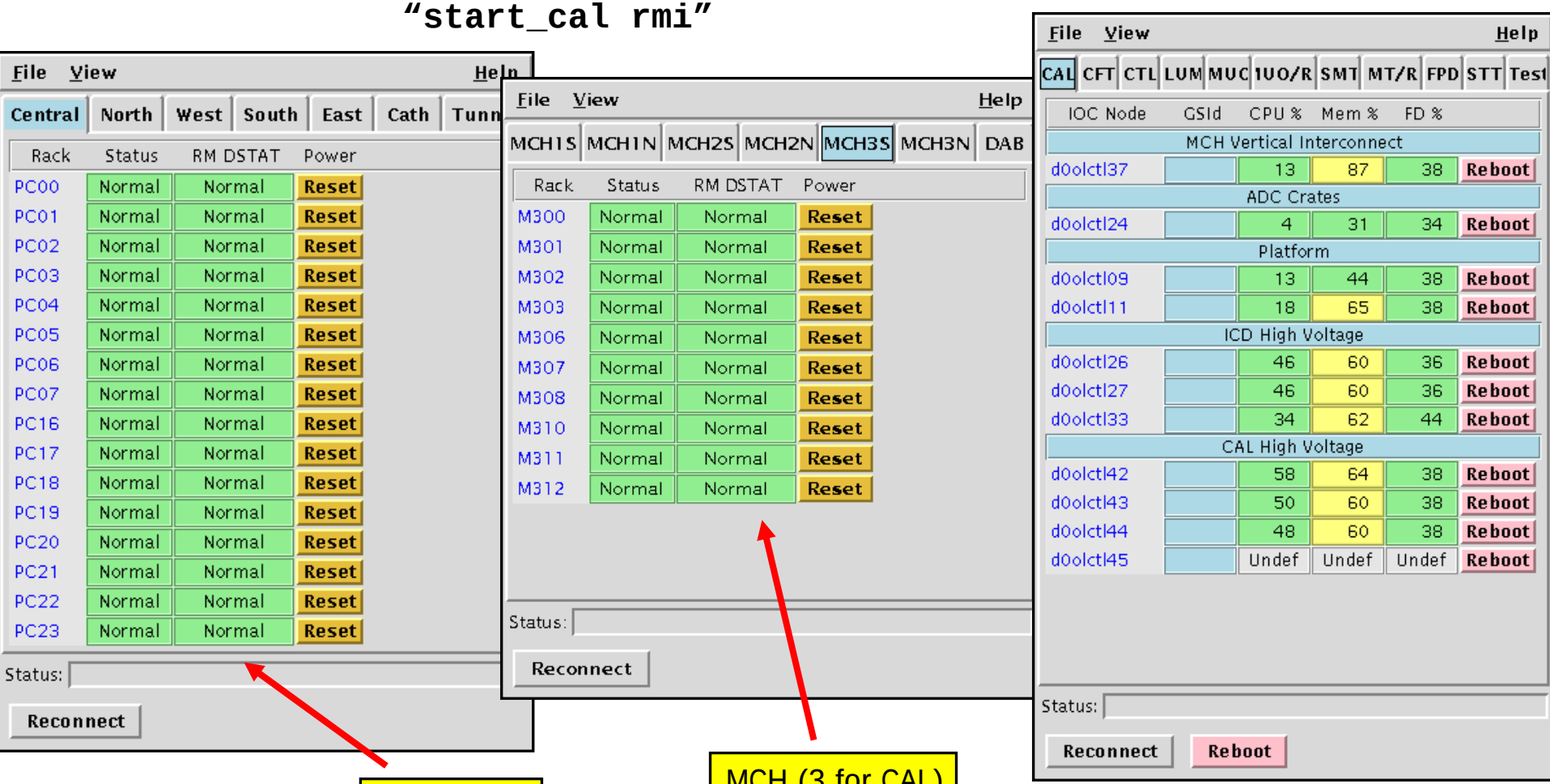
SHOW
GUIDANCE
CONTROL
ENABLE
ENABLE ALL
CLOSE

- Watch out for pink (major) alarms
- Check that disabled are "known" – disabled list

General Monitoring

“start_cal rmi”

“start_cal ioc”



Supply GUI

"start_cal supply"

File View Help

Preamp	BLS N	BLS C	BLS S	BLS BCK N	BLS BCK C	BLS BCK S	ADC Temp	PA Temp	Fanout	ADC	LAr Temp	Pulser	PLS Mode	Mode	Mode Shift

Device	+12VA V	+12VA I	+12VB V	+12VB I	+8VC V	+8VC I	+8VD V	+8VD I	+8VE V	+8VE I	+8VF V	+8VF I	-6VG V	-6VG I	-6VH V	-6VH I	Vic Tmp	Shn Tmp	Mag F	D1 Tmp	D2 Tmp	STAT	RM			
EC North																										
CALN_LVCP_PA00P	12.37	16.37	12.37	16.10	8.36	17.86	8.35	17.69	8.34	15.83	8.39	16.03	-6.28	23.52	-6.25	23.67	29.74	31.40	-10.01	38.57	29.79	0x3	0x0	On	Off	Reset
CALN_LVCP_PA00S	12.34	-0.48	12.35	0.33	8.30	0.18	8.29	0.48	8.30	-0.23	8.33	0.06	-6.19	0.16	-6.15	-0.16	17.92	13.43	1.71	9.28	15.14	0x2	0x0	On	Off	Reset
CALN_LVCP_PA01P	12.40	15.98	12.39	16.69	8.38	17.74	8.19	17.25	8.21	15.59	8.34	15.82	-6.23	23.47	-6.24	23.16	31.69	35.11	-9.03	30.76	33.69	0x3	0x0	On	Off	Reset
CALN_LVCP_PA01S	12.30	0.11	12.35	0.13	8.33	0.31	8.10	0.40	8.13	0.38	8.30	-0.06	-6.13	0.18	-6.13	0.10	18.31	16.06	-6.10	11.23	7.32	0x2	0x0	On	Off	Reset
CALN_LVCP_PA10P	12.59	16.33	12.44	16.43	8.39	17.75	8.43	17.75	8.47	16.38	8.32	16.11	-6.27	23.61	-6.28	23.28	34.38	39.16	-20.02	42.97	36.13	0x3	0x0	On	Off	Reset
CALN_LVCP_PA10S	12.48	0.28	12.28	-0.04	8.22	-0.13	8.31	-0.23	8.33	-0.11	8.23	0.40	-6.18	-0.09	-6.14	-0.43	18.60	18.21	-1.22	10.25	12.21	0x2	0x0	On	Off	Reset
CALN_LVCP_PA11P	12.31	16.50	12.49	16.35	8.45	17.85	8.44	18.09	8.49	16.33	8.37	16.06	-6.26	23.49	-6.26	23.46	33.69	33.69	-4.39	38.09	34.18	0x3	0x0	On	Off	Reset
CALN_LVCP_PA11S	12.17	0.04	12.57	0.21	8.27	-0.23	8.30	-0.06	8.34	0.28	8.24	-0.01	-6.12	-0.18	-6.13	0.16	17.53	18.70	-0.24	8.30	10.25	0x2	0x0	On	Off	Reset
CC																										
CALC_LVCP_PA02P	12.35	16.49	12.36	16.63	8.25	17.21	8.18	16.54	8.29	17.02	8.12	17.07	-6.24	23.12	-6.14	23.38	34.47	36.43	-11.23	34.18	38.09	0x3	0x0	On	Off	Reset
CALC_LVCP_PA02S	12.23	0.31	12.51	-0.09	8.18	0.21	8.11	-0.01	8.19	0.06	8.05	-0.33	-6.06	0.11	-6.00	-0.18	18.31	17.43	-0.24	15.14	14.16	0x2	0x0	On	Off	Reset
CALC_LVCP_PA03P	12.42	16.20	12.41	16.33	8.39	17.50	8.39	17.36	8.39	17.42	8.35	17.08	-6.26	23.82	-6.28	23.47	33.11	34.33	9.28	46.39	38.09	0x3	0x0	On	Off	Reset
CALC_LVCP_PA03S	12.32	0.28	12.31	-0.23	8.32	-0.01	8.31	-0.01	8.30	0.48	8.26	-0.21	-6.10	-0.38	-6.18	-0.70	18.70	15.58	14.40	8.79	10.74	0x2	0x0	On	Off	Reset
CALC_LVCP_PA08P	12.39	16.69	12.43	15.78	8.36	17.76	8.38	17.37	8.40	17.44	8.33	17.27	-6.31	23.38	-6.24	24.06	31.59	32.76	6.59	35.64	36.62	0x3	0x0	On	Off	Reset
CALC_LVCP_PA08S	12.33	-0.11	12.39	0.06	8.30	-0.13	8.31	-0.11	8.30	-0.18	8.30	0.13	-6.18	0.21	-6.18	-0.01	18.80	18.21	8.54	15.14	13.18	0x2	0x0	On	Off	Reset
CALC_LVCP_PA09P	12.40	16.59	12.33	16.37	8.37	17.71	8.36	17.18	8.37	17.49	8.34	17.35	-6.32	23.52	-6.34	23.94	32.86	34.03	0.24	25.88	35.64	0x3	0x0	On	Off	Reset
CALC_LVCP_PA09S	12.37	-0.01	12.36	0.12	8.29	-0.12	8.29	0.02	8.30	0.04	8.27	-0.27	-6.20	0.42	-6.22	0.12	18.75	17.68	-5.37	8.79	12.70	0x2	0x0	On	Off	Reset
EC South																										
CALS_LVCP_PA04P	12.39	16.44	12.40	16.93	8.39	17.53	8.40	17.31	8.43	15.99	8.41	16.04	-6.32	24.00	-6.24	23.68	30.57	36.82	1.46	38.09	30.27	0x3	0x0	On	Off	Reset
CALS_LVCP_PA04S	12.32	0.28	12.37	0.29	8.29	-0.31	8.30	0.40	8.32	0.00	8.33	0.26	-6.23	0.04	-6.14	0.16	18.12	18.80	16.85	17.09	16.11	0x2	0x0	On	Off	Reset
CALS_LVCP_PA05P	12.67	16.59	12.65	16.87	8.43	18.48	8.41	18.38	8.43	16.44	8.45	16.70	-6.30	23.44	-6.26	23.46	31.35	33.69	15.14	30.76	26.37	0x3	0x0	On	Off	Reset
CALS_LVCP_PA05S	12.71	-0.06	12.69	0.57	8.33	0.00	8.33	0.11	8.37	-0.07	8.36	-0.28	-6.18	-0.31	-6.16	0.23	17.82	17.72	13.92	10.25	13.18	0x2	0x0	On	Off	Reset
CALS_LVCP_PA06P	12.51	16.64	12.51	16.59	8.34	18.08	8.34	17.59	8.37	16.49	8.37	16.44	-6.25	23.62	-6.28	23.69	31.98	36.57	10.01	39.55	37.60	0x3	0x0	On	Off	Reset
CALS_LVCP_PA06S	12.34	0.46	12.30	-0.46	8.19	-0.27	8.22	0.37	8.25	-0.01	8.25	0.27	-5.94	-0.61	-5.93	0.10	18.55	15.92	-2.44	15.14	12.70	0x2	0x0	On	Off	Reset
CALS_LVCP_PA07P	12.68	16.42	12.69	17.18	8.55	18.44	8.52	18.79	8.61	17.13	8.53	16.74	-6.41	23.52	-6.39	23.96	32.96	31.40	21.24	38.57	36.62	0x3	0x0	On	Off	Reset
CALS_LVCP_PA07S	12.34	0.27	12.40	-0.17	8.31	-0.06	8.33	0.52	8.37	0.27	8.32	0.46	-6.19	-0.06	-6.14	-0.60	17.19	16.06	9.52	7.32	13.18	0x2	0x0	On	Off	Reset
ICD																										
ICD_LVCP_PW09	12.77	2.48									8.70	5.80	-6.36	3.67			25.05	36.87				0x3	0x0	On	Off	Reset
Global Buttons																										
Global	Turn ON Primary	Turn ON Second	Turn OFF All	Reset All																						

Status:

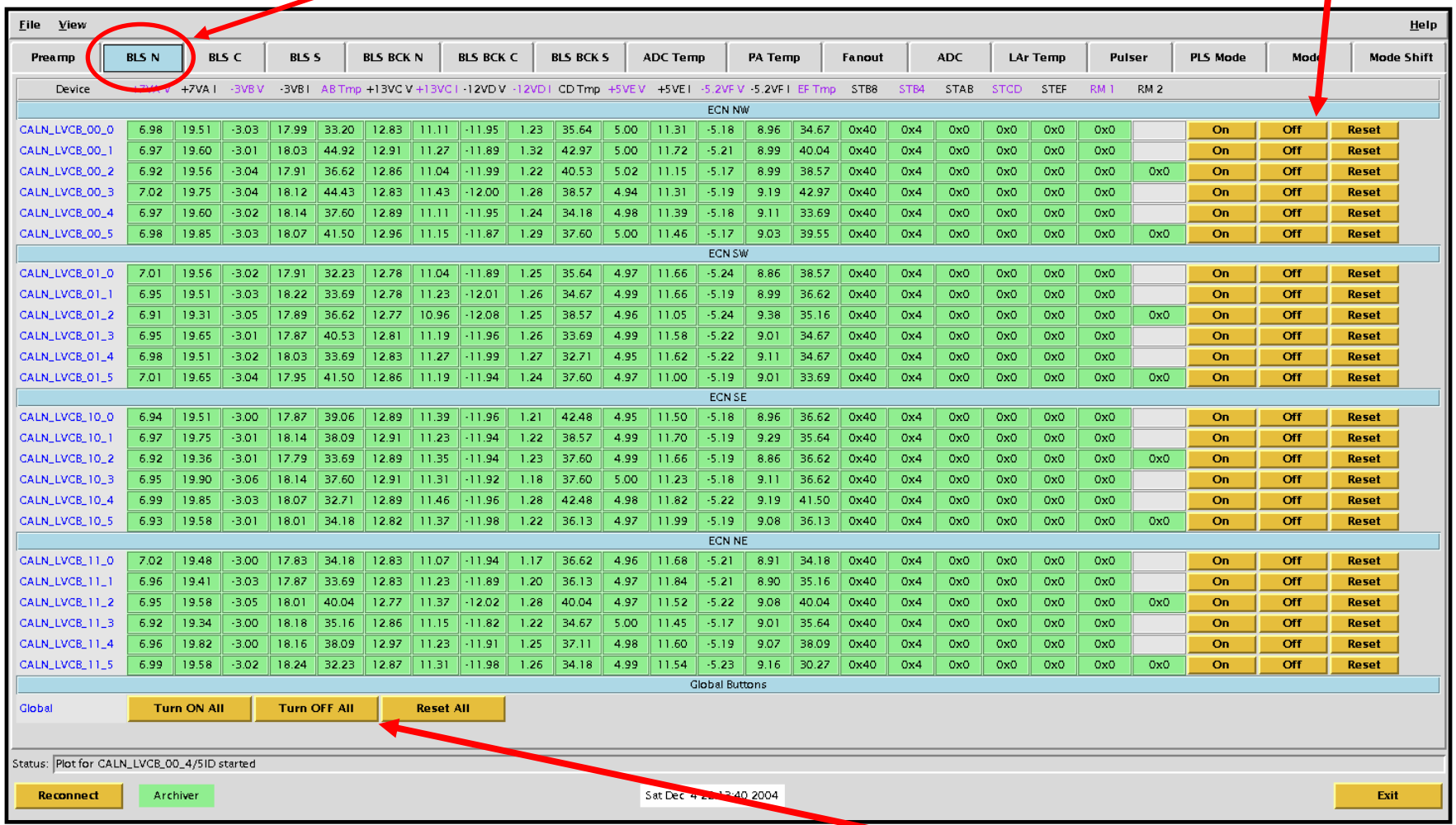
Reconnect | Archiver | Sat Dec 4 22:03:23 2004 | Exit

Keep an eye on the archiver status!

Supply GUI cont...

16 pages (TABS) of information

Individual channel



File View Help

Preamp | BLS N | BLS C | BLS S | BLS BCK N | BLS BCK C | BLS BCK S | ADC Temp | PA Temp | Fanout | ADC | LAr Temp | Pulser | PLS Mode | Mode | Mode Shift

Device	-13VA V	+7VA I	-3VB V	-3VB I	AB Tmp	+13VC V	+13VC I	-12VD V	-12VD I	CD Tmp	+5VE V	+5VE I	-5.2VF V	-5.2VF I	EF Tmp	STB8	STB4	STAB	STCD	STEF	RM 1	RM 2			
ECN NW																									
CALN_LVCB_00_0	6.98	19.51	-3.03	17.99	33.20	12.83	11.11	-11.95	1.23	35.64	5.00	11.31	-5.18	8.96	34.67	0x40	0x4	0x0	0x0	0x0	0x0		On	Off	Reset
CALN_LVCB_00_1	6.97	19.60	-3.01	18.03	44.92	12.91	11.27	-11.89	1.32	42.97	5.00	11.72	-5.21	8.99	40.04	0x40	0x4	0x0	0x0	0x0	0x0		On	Off	Reset
CALN_LVCB_00_2	6.92	19.56	-3.04	17.91	36.62	12.86	11.04	-11.99	1.22	40.53	5.02	11.15	-5.17	8.99	38.57	0x40	0x4	0x0	0x0	0x0	0x0	0x0	On	Off	Reset
CALN_LVCB_00_3	7.02	19.75	-3.04	18.12	44.43	12.83	11.43	-12.00	1.28	38.57	4.94	11.31	-5.19	9.19	42.97	0x40	0x4	0x0	0x0	0x0	0x0		On	Off	Reset
CALN_LVCB_00_4	6.97	19.60	-3.02	18.14	37.60	12.89	11.11	-11.95	1.24	34.18	4.98	11.39	-5.18	9.11	33.69	0x40	0x4	0x0	0x0	0x0	0x0		On	Off	Reset
CALN_LVCB_00_5	6.98	19.85	-3.03	18.07	41.50	12.96	11.15	-11.87	1.29	37.60	5.00	11.46	-5.17	9.03	39.55	0x40	0x4	0x0	0x0	0x0	0x0	0x0	On	Off	Reset
ECN SW																									
CALN_LVCB_01_0	7.01	19.56	-3.02	17.91	32.23	12.78	11.04	-11.89	1.25	35.64	4.97	11.66	-5.24	8.86	38.57	0x40	0x4	0x0	0x0	0x0	0x0		On	Off	Reset
CALN_LVCB_01_1	6.95	19.51	-3.03	18.22	33.69	12.78	11.23	-12.01	1.26	34.67	4.99	11.66	-5.19	8.99	36.62	0x40	0x4	0x0	0x0	0x0	0x0		On	Off	Reset
CALN_LVCB_01_2	6.91	19.31	-3.05	17.89	36.62	12.77	10.96	-12.08	1.25	38.57	4.96	11.05	-5.24	9.38	35.16	0x40	0x4	0x0	0x0	0x0	0x0	0x0	On	Off	Reset
CALN_LVCB_01_3	6.95	19.65	-3.01	17.87	40.53	12.81	11.19	-11.96	1.26	33.69	4.99	11.58	-5.22	9.01	34.67	0x40	0x4	0x0	0x0	0x0	0x0		On	Off	Reset
CALN_LVCB_01_4	6.98	19.51	-3.02	18.03	33.69	12.83	11.27	-11.99	1.27	32.71	4.95	11.62	-5.22	9.11	34.67	0x40	0x4	0x0	0x0	0x0	0x0		On	Off	Reset
CALN_LVCB_01_5	7.01	19.65	-3.04	17.95	41.50	12.86	11.19	-11.94	1.24	37.60	4.97	11.00	-5.19	9.01	33.69	0x40	0x4	0x0	0x0	0x0	0x0	0x0	On	Off	Reset
ECN SE																									
CALN_LVCB_10_0	6.94	19.51	-3.00	17.87	39.06	12.89	11.39	-11.96	1.21	42.48	4.95	11.50	-5.18	8.96	36.62	0x40	0x4	0x0	0x0	0x0	0x0		On	Off	Reset
CALN_LVCB_10_1	6.97	19.75	-3.01	18.14	38.09	12.91	11.23	-11.94	1.22	38.57	4.99	11.70	-5.19	9.29	35.64	0x40	0x4	0x0	0x0	0x0	0x0		On	Off	Reset
CALN_LVCB_10_2	6.92	19.36	-3.01	17.79	33.69	12.89	11.35	-11.94	1.23	37.60	4.99	11.66	-5.19	8.86	36.62	0x40	0x4	0x0	0x0	0x0	0x0	0x0	On	Off	Reset
CALN_LVCB_10_3	6.95	19.90	-3.06	18.14	37.60	12.91	11.31	-11.92	1.18	37.60	5.00	11.23	-5.18	9.11	36.62	0x40	0x4	0x0	0x0	0x0	0x0		On	Off	Reset
CALN_LVCB_10_4	6.99	19.85	-3.03	18.07	32.71	12.89	11.46	-11.96	1.28	42.48	4.98	11.82	-5.22	9.19	41.50	0x40	0x4	0x0	0x0	0x0	0x0		On	Off	Reset
CALN_LVCB_10_5	6.93	19.58	-3.01	18.01	34.18	12.82	11.37	-11.98	1.22	36.13	4.97	11.99	-5.19	9.08	36.13	0x40	0x4	0x0	0x0	0x0	0x0	0x0	On	Off	Reset
ECN NE																									
CALN_LVCB_11_0	7.02	19.48	-3.00	17.83	34.18	12.83	11.07	-11.94	1.17	36.62	4.96	11.68	-5.21	8.91	34.18	0x40	0x4	0x0	0x0	0x0	0x0		On	Off	Reset
CALN_LVCB_11_1	6.96	19.41	-3.03	17.87	33.69	12.83	11.23	-11.89	1.20	36.13	4.97	11.84	-5.21	8.90	35.16	0x40	0x4	0x0	0x0	0x0	0x0		On	Off	Reset
CALN_LVCB_11_2	6.95	19.58	-3.05	18.01	40.04	12.77	11.37	-12.02	1.28	40.04	4.97	11.52	-5.22	9.08	40.04	0x40	0x4	0x0	0x0	0x0	0x0	0x0	On	Off	Reset
CALN_LVCB_11_3	6.92	19.34	-3.00	18.18	35.16	12.86	11.15	-11.82	1.22	34.67	5.00	11.45	-5.17	9.01	35.64	0x40	0x4	0x0	0x0	0x0	0x0		On	Off	Reset
CALN_LVCB_11_4	6.96	19.82	-3.00	18.16	38.09	12.97	11.23	-11.91	1.25	37.11	4.98	11.60	-5.19	9.07	38.09	0x40	0x4	0x0	0x0	0x0	0x0		On	Off	Reset
CALN_LVCB_11_5	6.99	19.58	-3.02	18.24	32.23	12.87	11.31	-11.98	1.26	34.18	4.99	11.54	-5.23	9.16	30.27	0x40	0x4	0x0	0x0	0x0	0x0	0x0	On	Off	Reset
Global Buttons																									
Global	Turn ON All			Turn OFF All			Reset All																		

Status: Plot for CALN_LVCB_00_4/5ID started

Reconnect | Archiver | Sat Dec 4 2004 | Exit

All channels

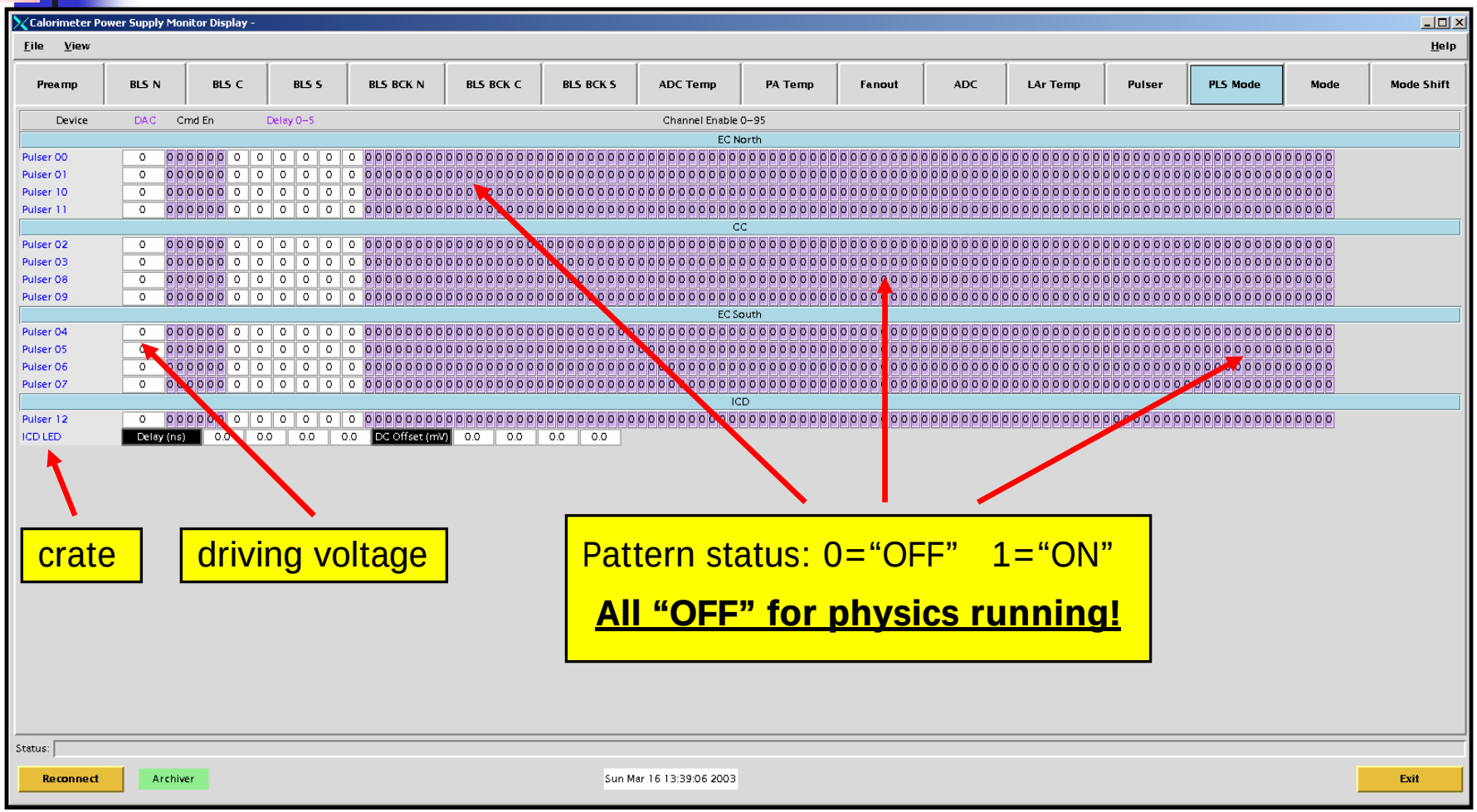
Supply GUI cont...

It's important to be able to give details to expert

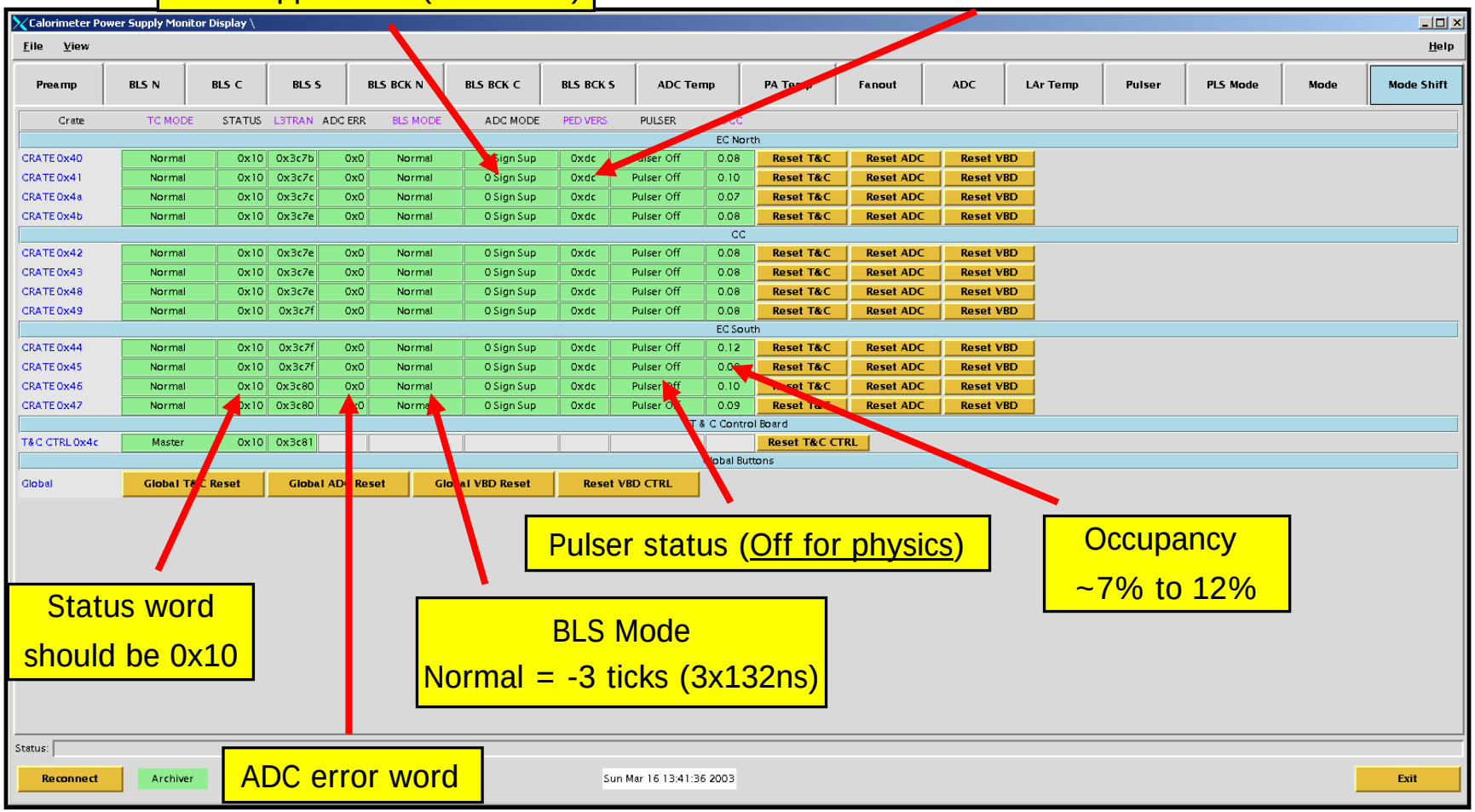
attribute

channel

Supply GUI – pulser

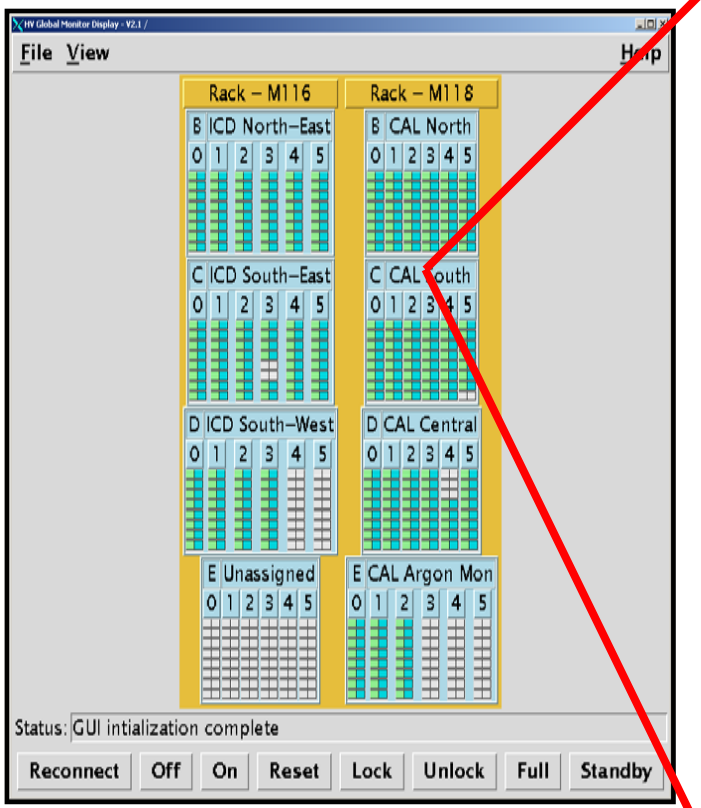


Supply GUI – Shifter Mode

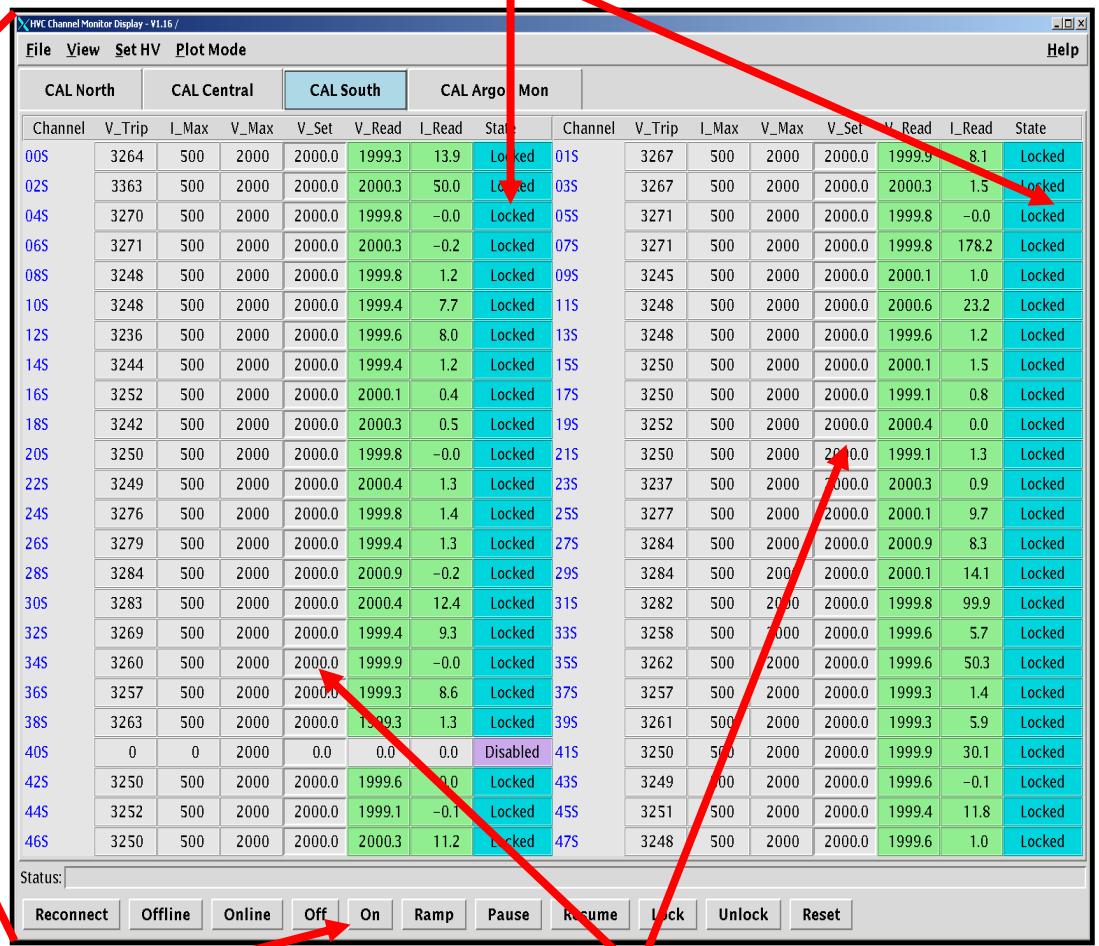


HV GUI

"start_cal hv"



Change individual channel

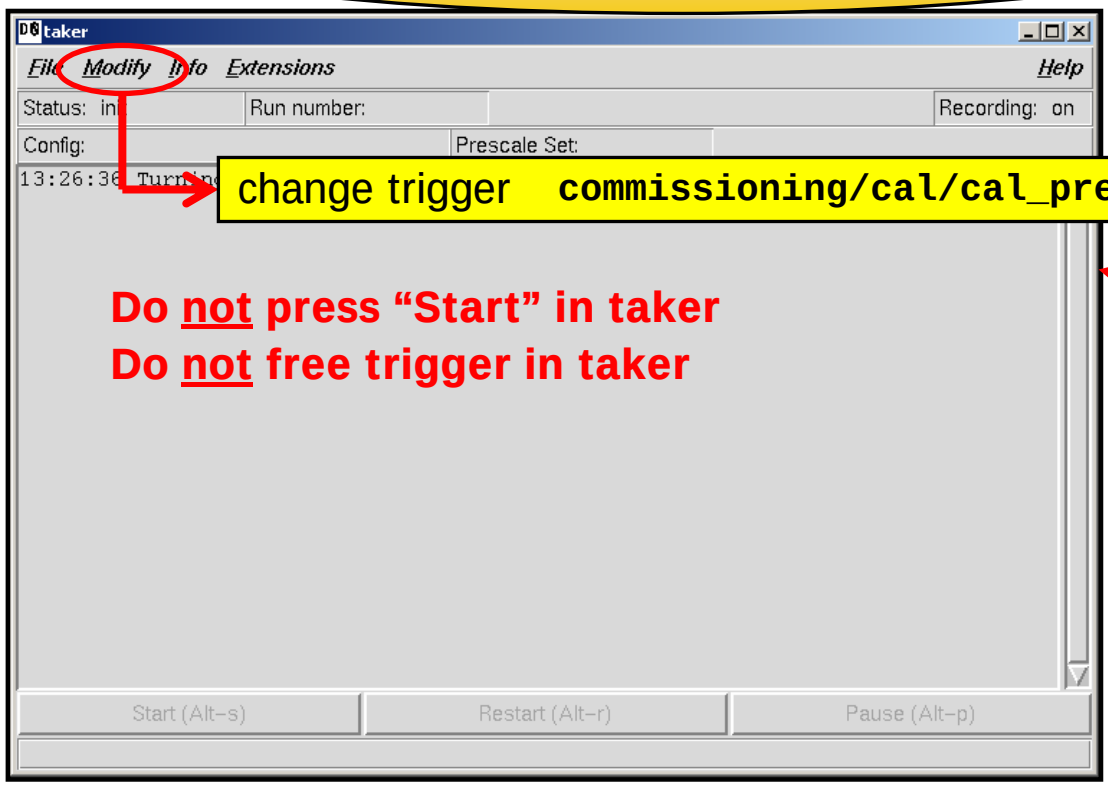


Change all channels

Can enter voltage by hand

Before Store

cal_prepare_for_run is a special configuration file that sets up the calorimeter for the coming store.



change trigger **commissioning/cal/cal_prepare_for_run-2.4**

Do not press "Start" in taker

Do not free trigger in taker

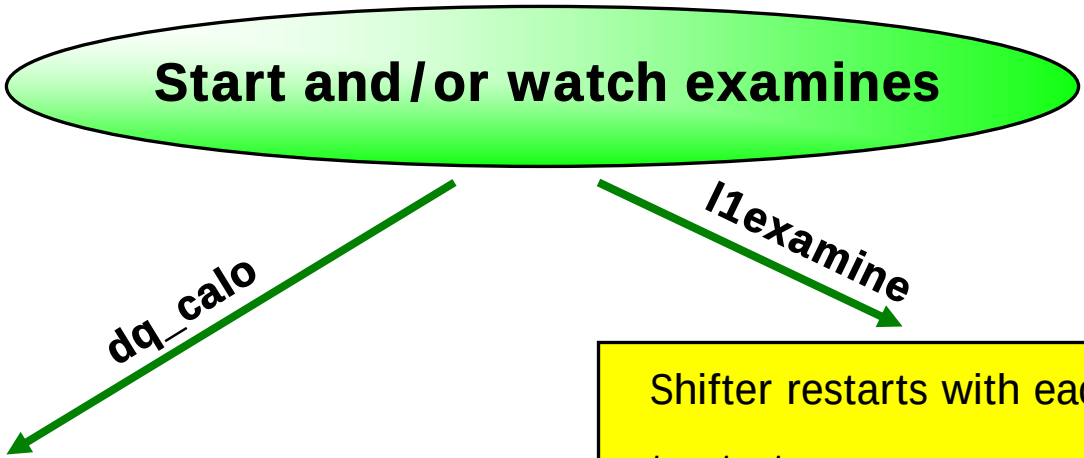
taker

"start_daq taker"

Also: - check for major alarms

- check pulsers are OFF

During Store



Automatically starts with new run

(...still keep an eye on it)

to start/restart:

```
start_cal dq_calo
start_cal
```

Shifter restarts with each new run

to start:

```
start_cal
start_cal l1examine
    init
    start
```

to stop:

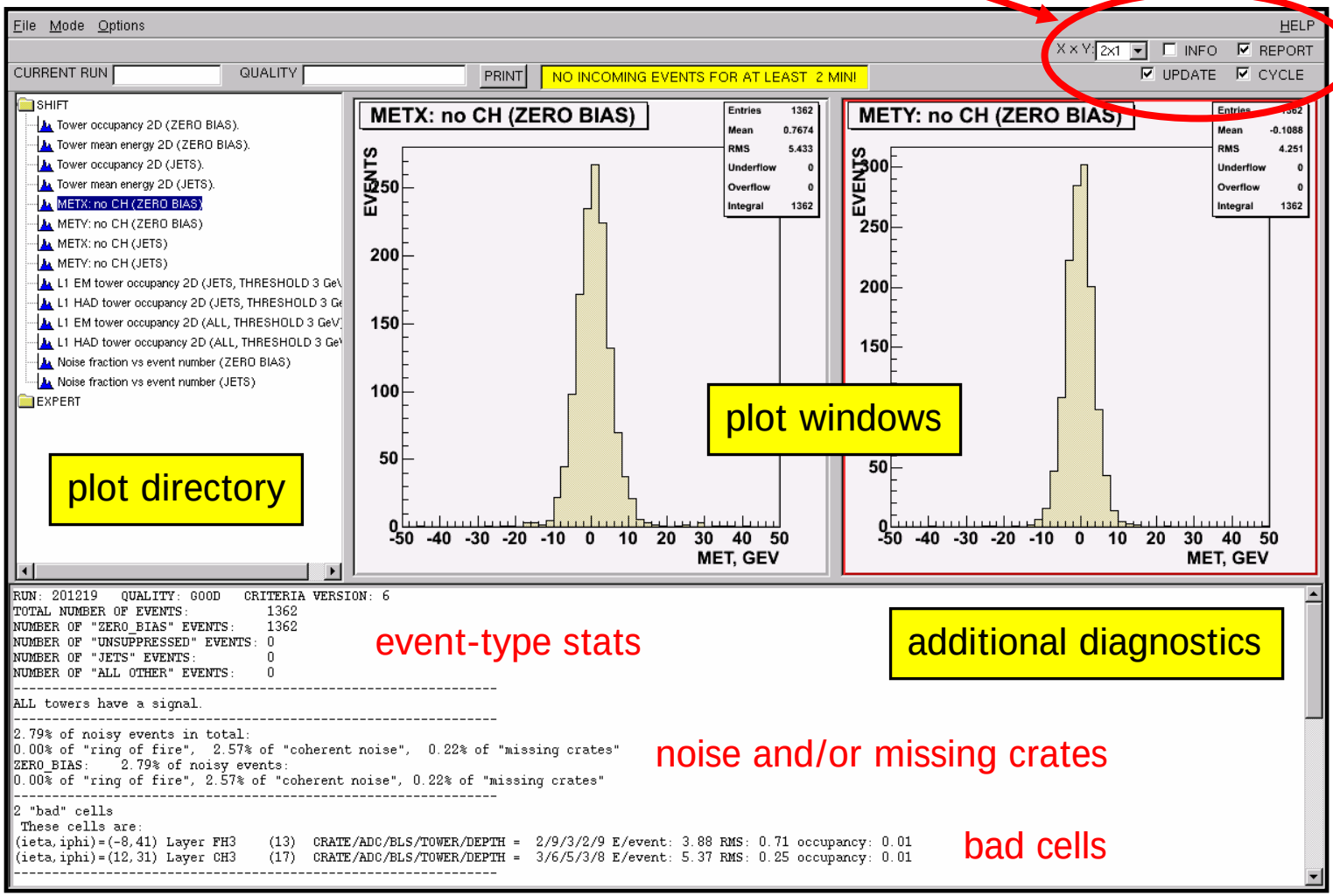
```
    stop
    quit
```

Calorimeter

L1 Cal trigger

DQ_calo – Overview

examine behaviour settings

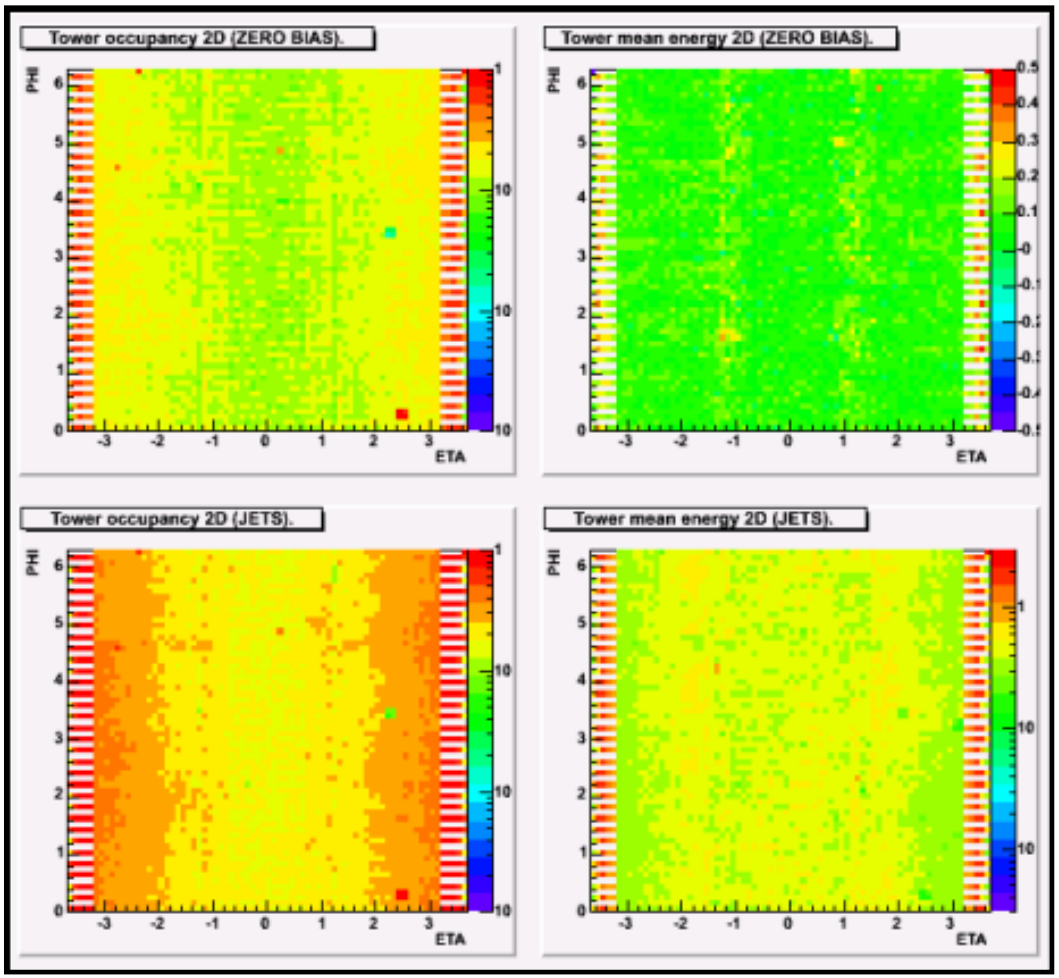


dq_calo (healthy example)

Occupancy <Energy>

Zero bias

Jets

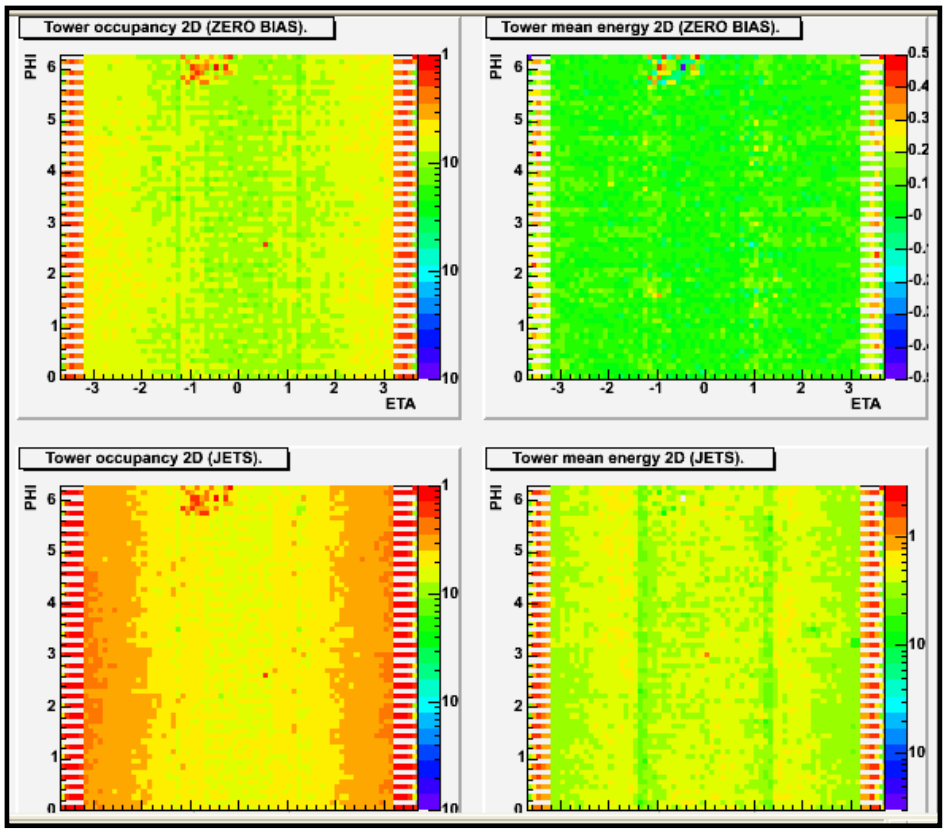


Powerful tool for shifter … and experts!

Be familiar with the plots
Be alert – look for changes
Paste anomalies in logbook
Compare various plots
Communicate with GM shifter

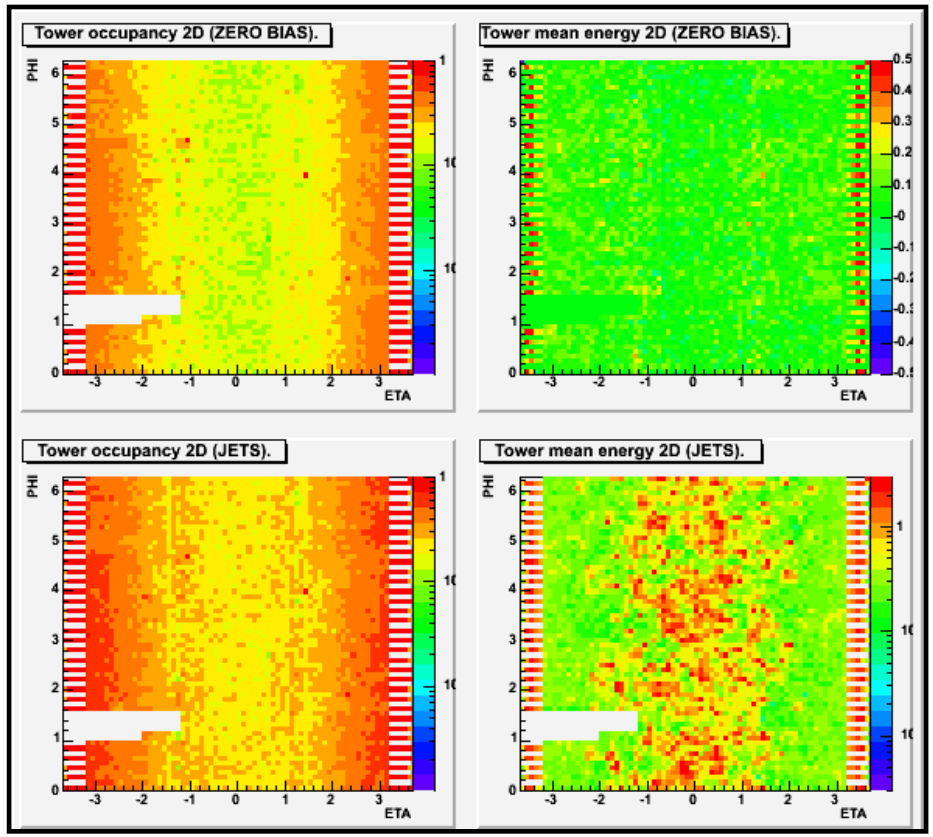
dq_calo (problem examples)

Bad



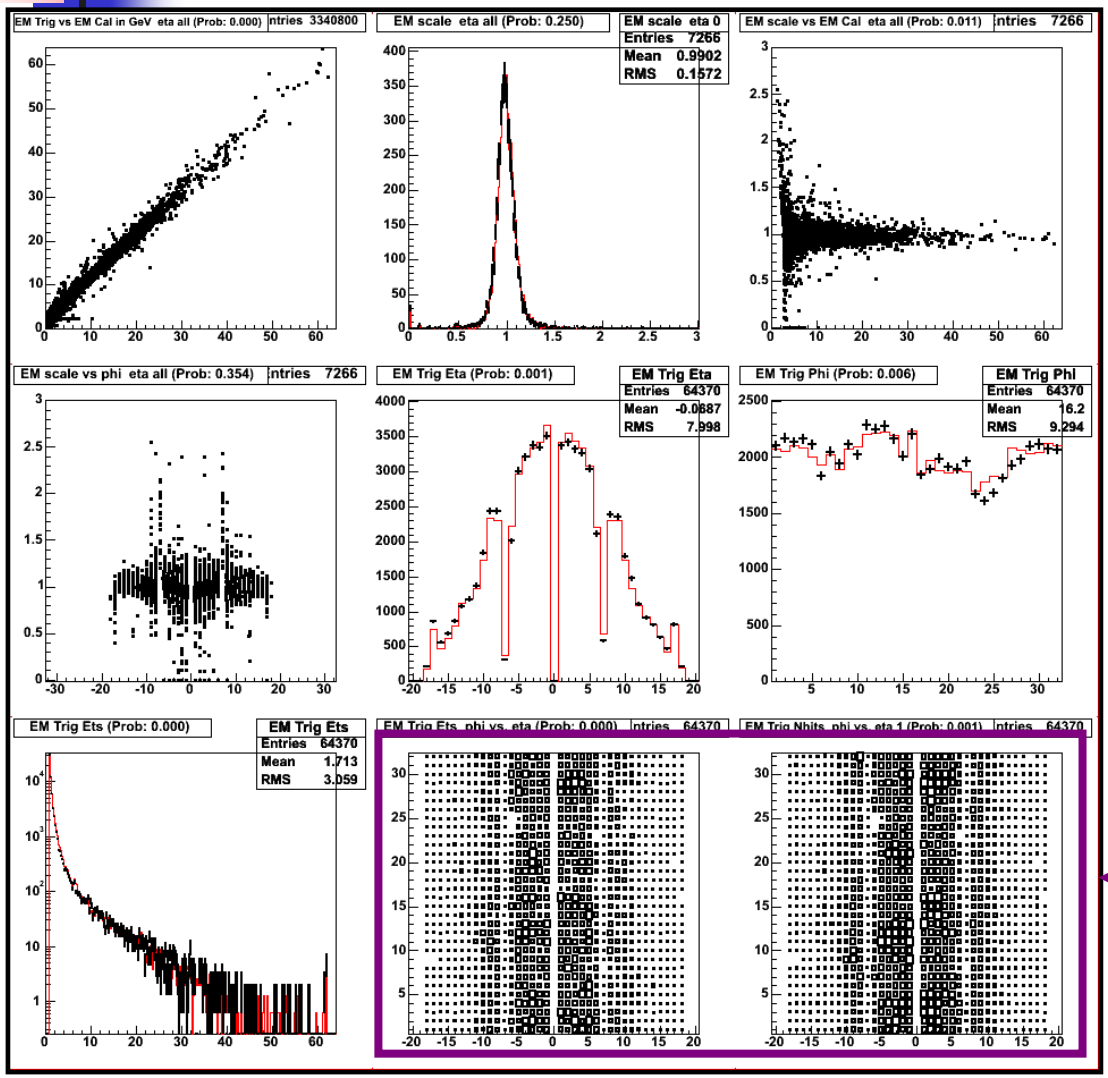
BLS cable harness problem

REALLY Bad!



Problem with pedestals

L1CalExamine



Sorry to be repetitive,

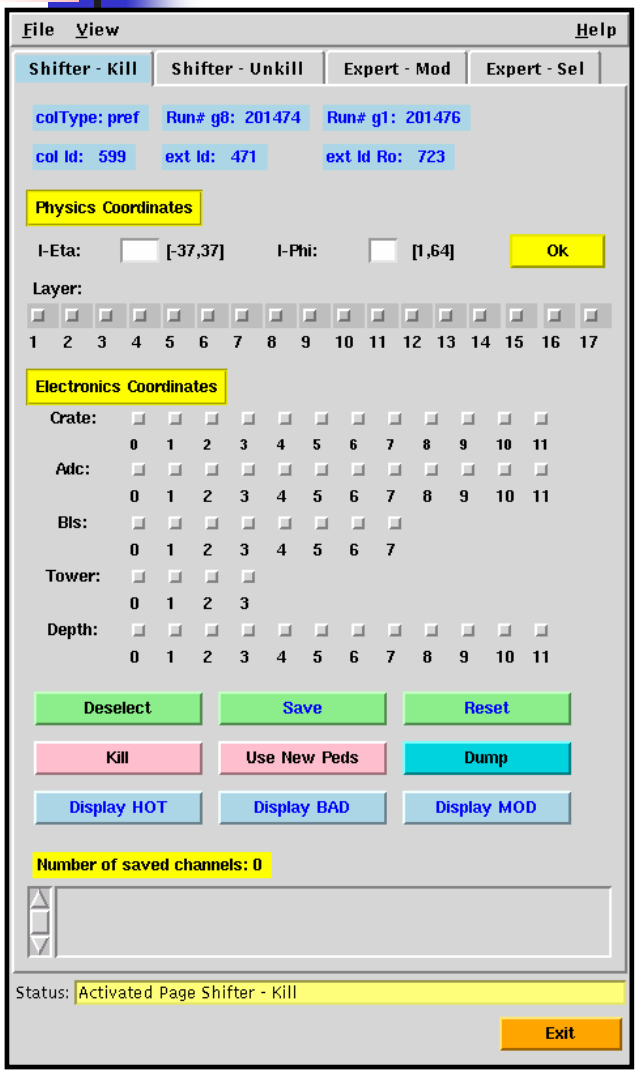
but…

Be familiar with the plots
Be alert – look for changes
Paste anomalies in logbook
Compare various plots
Communicate with GM shifter

One page for EM, one for HAD

← Trigger E_T and hits in (η,ϕ)

Killing Hot Cells (with expert)



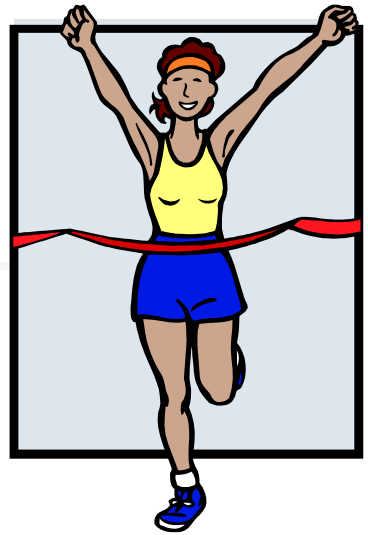
If a CAL cell is causing problems with L3 rates, it may have to be killed.

- Discuss with captain
- Page expert
- Have coordinates of cell ready (phys. or elec.)
- In coordination with expert:

```
start_cal D0run
start_cal
```

- Ask for run to be stopped and trigger freed
- Enter coords –> Kill –> Save
- Download cal_prepare_for_run
- Resume running and make sure problem fixed!

End of Run



- Save histograms and paste in logbook
- Complete CALMUO checklist
- Get ready to restart l1examine

- If store ends, set MUON HV to STANDBY
- CAL HV stays up always

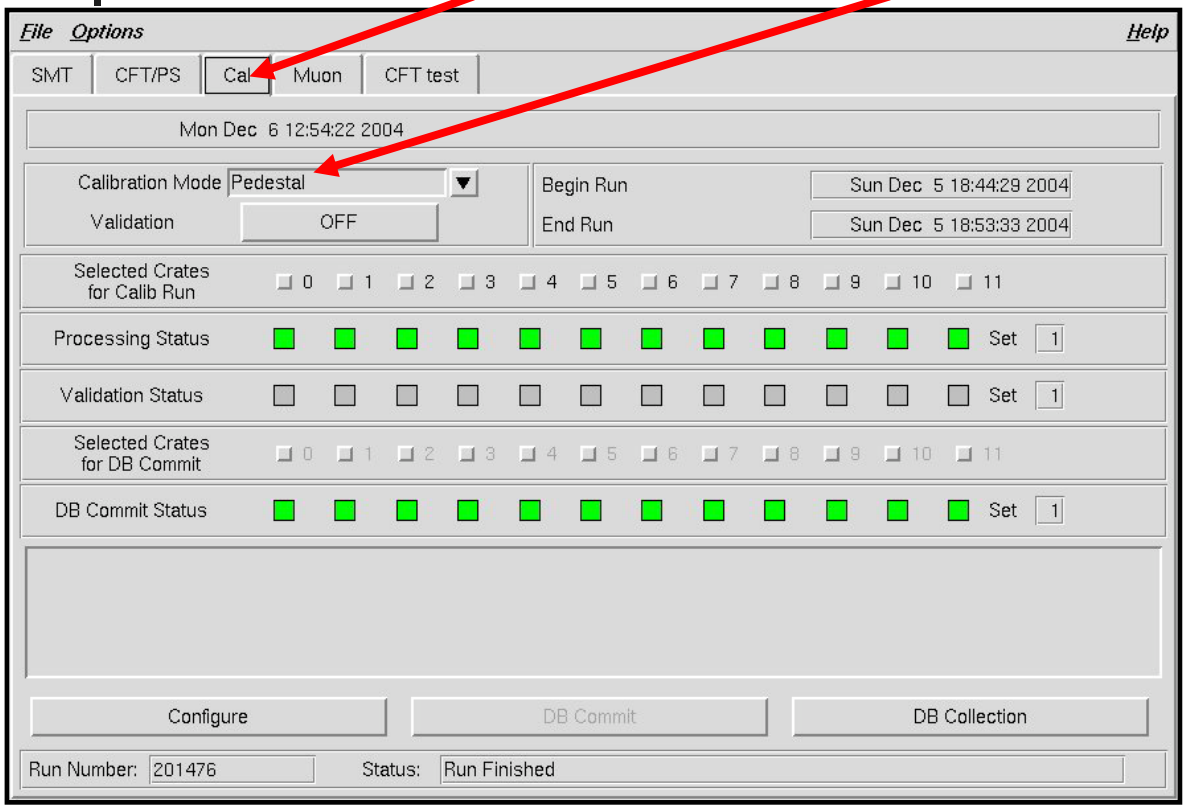
Between Stores

- Perform pedestal calibration
  - No beam in machine (ask Captain)
  - If time is short take gain 8 only – otherwise take gain 1 as well
- Keep system running, monitor examines
- Help out experts
  - Assist with NLC “ramp runs”
  - During access assist with running diagnostics
  - Make entries in logbook
  - After any changes be sure pedestals are taken
- Shift cancellation
  - During extended Tevatron downtime shifts may be cancelled
  - Check with Captain, CAL expert, and MUON expert first

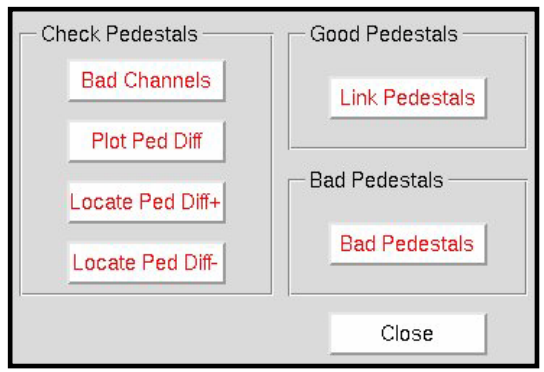
Pedestal Calibration

Select “Cal”

Select “Pedestal”



Ask for CAL <u>and</u> SMT crates
Use taker to start each run
<u>Never</u> stop calib run with taker!
After runs taken, give back SMT
Record run #’s in logbook
If Ped Diff plot looks bad, page expert
Link pedestals
Paste Ped Diff plots in logbook

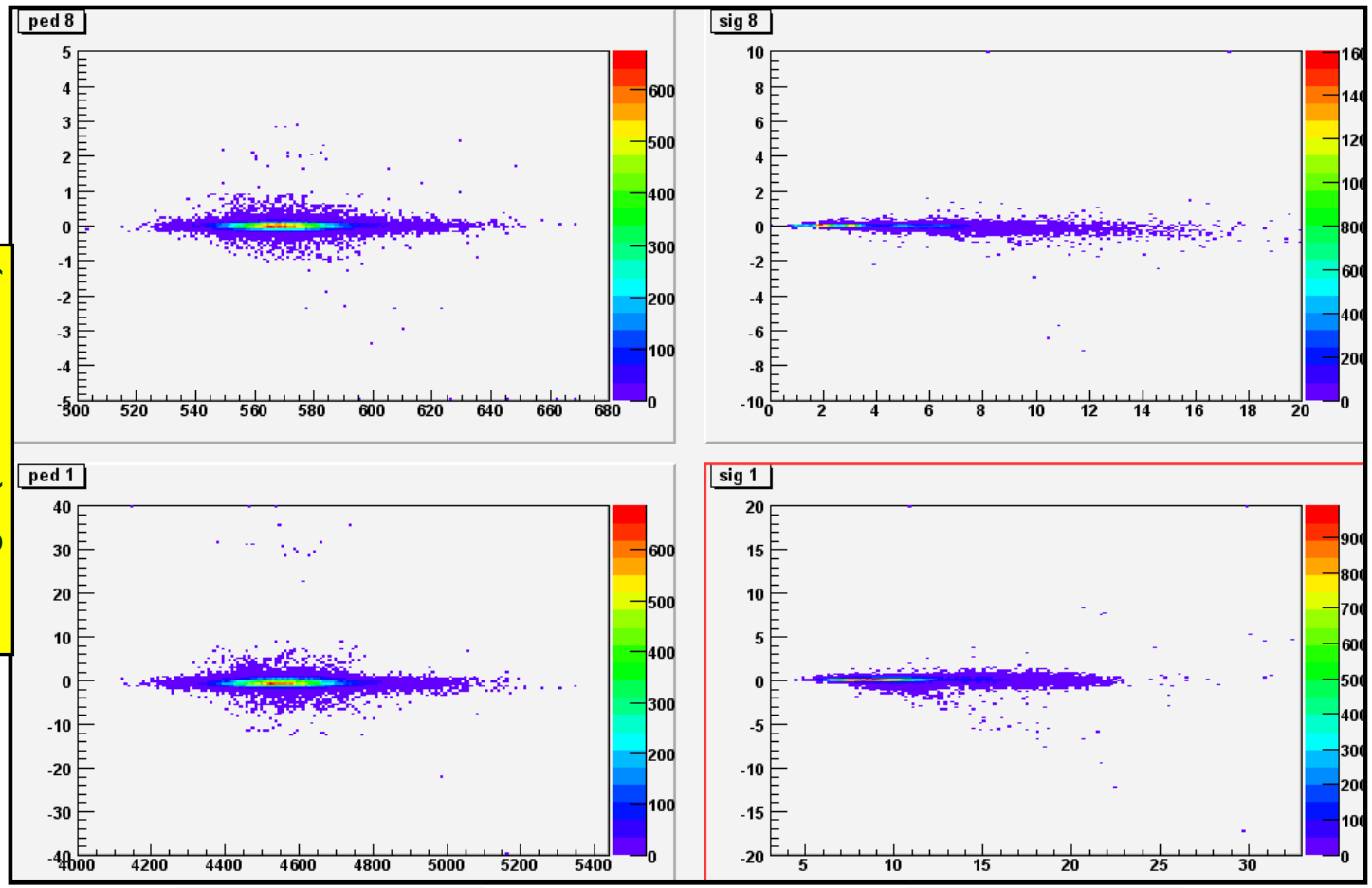


<u>How to run GUIs</u>

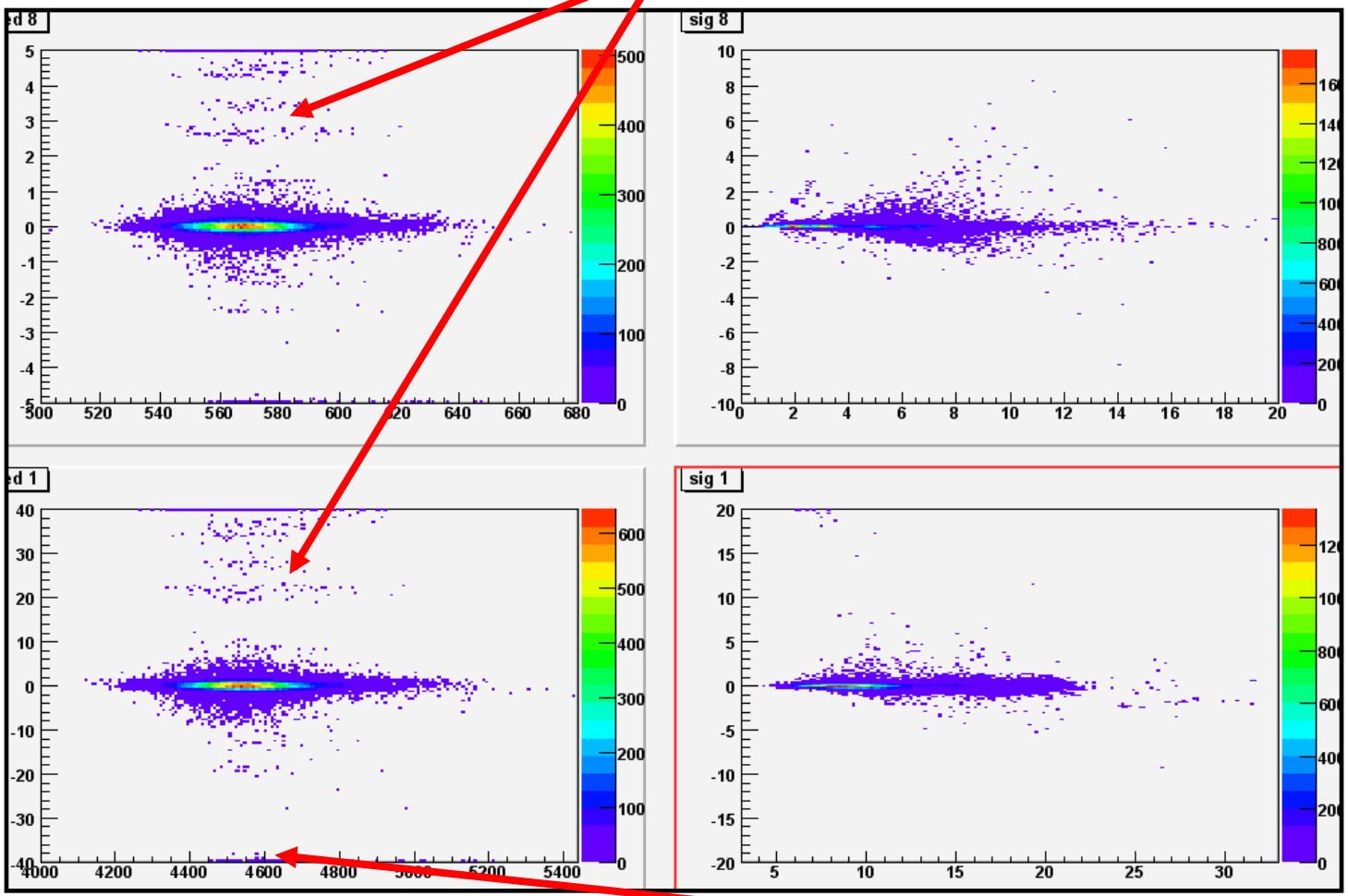
```
start_cal
Run_cal
calib
```

Follow instructions in manual

Good Pedestals



Post-repair Pedestals

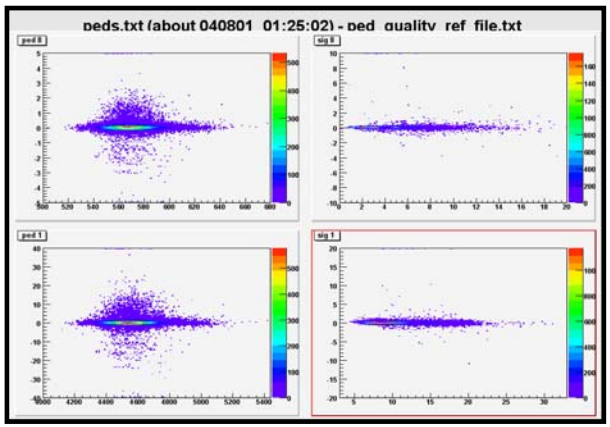


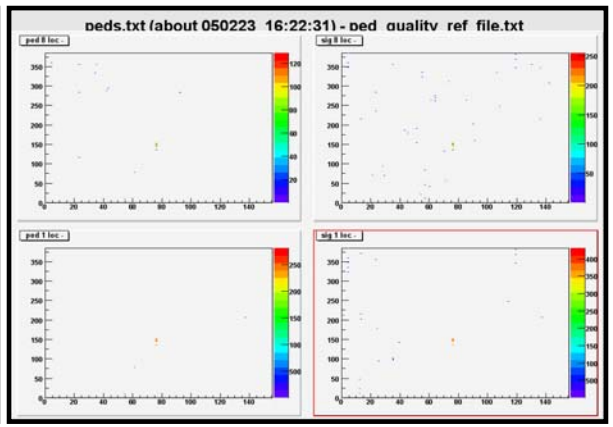
Example Log Entry

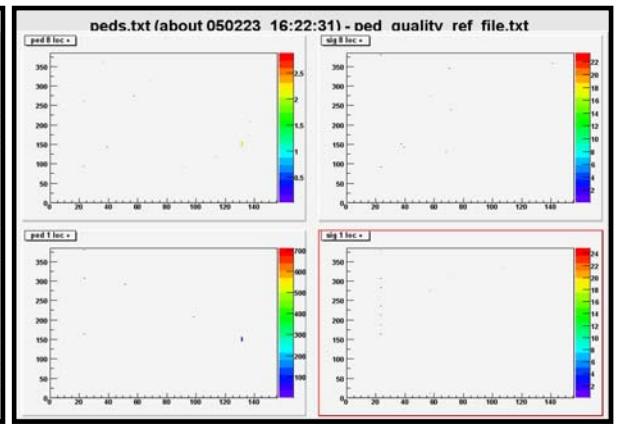
Starting calorimeter pedestal calibration run.

SMT is off.

Run 195816 x8, run 195817 x1. These two runs went OK.







Bad Channels:

3 1 3 0 6 578.11 63.37 576.80 55.25 4567.73 18.30 4 E-ped8
4 9 5 2 11 579.97 99.99 575.42 50.72 4586.80 66.11 4 E-ped8
Calibration looks OK to me so I linked the pedestals.

Summary

- All details of shifter duties and troubleshooting can be found in the CAL shifter's guide (white binder or web)
- If in doubt... page expert!